

Section E
Vegetation, Wildlife and Aquatic Resources

METHODS

General

This characterization and assessment of wildlife and botanical resources of the proposed project site is based on a field survey conducted on November 18, 1987 by a Jones & Stokes Associates staff wildlife biologist and botanist. A search of the California Natural Diversity Data Base (NDDDB) for special-status species and habitats and contacts with U. S. Fish and Wildlife (USFWS) and DFG personnel supplemented the field surveys.

Supplemental Wildlife Surveys

Informal surveys of the project vicinity by DFG personnel suggested that geese, ducks, and other birds might use the project site extensively in winter (Mapes pers. comm.). USFWS also suggested that waterfowl and other wildlife would use this area most frequently after heavy rains when ponded water accumulates in agricultural fields of the project area (Kohl pers. comm.).

In response to these concerns, Jones & Stokes Associates biologists undertook field surveys to determine the extent of wildlife use of the project site and vicinity in winter. Five supplemental field surveys (January 21, February 19, March 4, and 17, and April 6, 1988) were conducted throughout the day (early mornings, midday, and late afternoons). During each survey, all passable roads in the project area were driven and all wildlife species observed were recorded in field notes. Sign such as tracks, scat, and burrows were used, in addition to direct observations to detect mammals, reptiles, and amphibians during the field surveys. Special emphasis was placed on a previously existing borrow pit pond, irrigation ditches, natural channels, and ponded water areas in agricultural fields.

OVERVIEW

Habitats

Nearly all lands within the project area have been developed for agricultural production or disturbed by related activities. None of the original native habitats of the project area presently occurs on the site, but

natural-appearing wetland habitats (freshwater marsh and open water-aquatic) exist along irrigation ditches. Disturbed "ruderal" habitats along canal edges, roads, and agricultural fields support weedy upland vegetation with occasional native and ornamental trees and shrubs. Undeveloped habitats outside and adjacent to the project area support open water-aquatic, freshwater marsh, and riparian woodland habitats.

Until recently an 11.5-acre borrow pit supported the most important biological resource on the project site with its mosaic of open water (7.5 acres) and freshwater marsh (4.0 acres) wetland habitats. Scattered clumps of young growth willow, cottonwood, and buttonbush encircled the wetland and further enhanced its biological values. In July 1988, the borrow pit was dewatered and graded by Reclamation District 2074 as part of its levee improvement plans.

Characteristic Wildlife

During six field surveys, 70 bird species, six mammal species, three reptile species, and a single amphibian species were observed in the project area (Table E-1). These results indicate that a diverse wildlife community exists at this site, reflecting the existing habitat diversity of wetlands, agricultural fields, and upland vegetation. The larger irrigation canals offer habitat to the highest diversity and abundance of wildlife species in the project area. The borrow pit pond formerly offered even higher quality habitat.

A high diversity of waterfowl was observed during the field surveys including greater white-fronted goose (flyover), green-winged teal, mallard, cinnamon teal, gadwall, American wigeon, canvasback, ring-necked duck, bufflehead, and ruddy duck. Most of these species were seen only at the former borrow pit pond, where the combination of open water, emergent vegetation, and relative lack of human disturbance provided favorable waterfowl habitat. Despite the diversity of waterfowl at the project site, none of these species was abundant (Table E-1), and only the mallard was present during all surveys.

Agricultural fields of the project area were surveyed after periods of heavy rain in January and March; February had little measurable precipitation and the fields were entirely dry during this survey. Five mallards were seen at a muddy depression in an agricultural field and two cinnamon teal were flushed from a nearby irrigation canal. No other waterfowl use of these fields was observed during the field surveys. Because of the high levees surrounding the project area, it is unlikely that agricultural fields are extensively flooded, even during wet winters. The lack of large wetlands and the presence of urban development on three sides combine to make the project site less favorable waterfowl habitat than the farmlands on the west side of the San Joaquin River.

Although high numbers of migratory waterfowl were not abundant during the field surveys, the project site has high wildlife habitat value. Herons, egrets, raptors, pheasants, and songbirds frequent this site (Table

Table E-1. Wildlife Species Observed During Field Surveys of the Brookside Project Area, San Joaquin County, California

| SPECIES a | | | | | | | |
|-------------------------------|--------------------------------|-------|------|-------|-----|------|-------|
| COMMON NAME | SCIENTIFIC NAME | 11/18 | 1/21 | 2/19 | 3/4 | 3/17 | 4/6 |
| BIRDS | | | | | | | |
| Pied-billed Grebe | <i>Podilymbus podiceps</i> | 1 | 2 | 4 | 1 | 1 | 1 |
| Double-crested Cormorant | <i>Phalacrocorax auritus</i> | | 30 + | | | | 3 |
| American Bittern | <i>Botaurus lentiginosus</i> | 1 | | | | | 2 |
| Great Blue Heron | <i>Ardea herodias</i> | 2 | 5 | 2 | 1 | 1 | 1 |
| Green-backed Heron | <i>Butorides striatus</i> | | | | | | 1 |
| Black-crowned Night Heron | <i>Nycticorax nycticorax</i> | | 2 | | | | |
| Great Egret | <i>Casmerodius albus</i> | 2 | | 1 | 3 | 2 | |
| Snowy Egret | <i>Egretta thula</i> | | | 1 | | | |
| Greater White-fronted Goose b | <i>Anser albifrons</i> | | | | | | 200 + |
| Green-winged Teal | <i>Anas crecca</i> | | | | 8 | | |
| Mallard | <i>Anas platyrhynchos</i> | 5 | 3 | 30 + | 9 | 4 | 14 |
| Cinnamon Teal | <i>Anas cyanoptera</i> | | | | 4 | | |
| Gadwall | <i>Anas strepera</i> | | 3 | | | | |
| American Wigeon | <i>Anas americana</i> | | | 2 | | | |
| Canvasback | <i>Aythya valisineria</i> | 3 | 3 | 4 | | 2 | |
| Ring-necked Duck | <i>Aythya collaris</i> | 4 | | | | | |
| Bufflehead | <i>Bucephala albeola</i> | 4 | 4 | | | | |
| Ruddy Duck | <i>Oxyura jamaicensis</i> | 3 | | | | | |
| Black-shouldered Kite | <i>Elanus caeruleus</i> | 2 | 2 | 2 | | | 3 |
| Northern Harrier | <i>Circus cyaneus</i> | 1 | | 1 | 11 | 1 | 3 |
| Red-shouldered Hawk | <i>Buteo lineatus</i> | | | | 1 | | |
| Red-tailed Hawk | <i>Buteo jamaicensis</i> | 1 | 3 | 2 | 4 | 2 | 1 |
| American Kestrel | <i>Falco sparverius</i> | 3 | 5 | 1 | 4 | 4 | 2 |
| Accipiter species | | | 1 | | | | |
| Ring-necked Pheasant | <i>Phasianus colchicus</i> | 2 | | | | | 3 |
| California Quail | <i>Callipepla californica</i> | 15 + | | 25 + | 15 | | 26 |
| Virginia Rail | <i>Rallus limicola</i> | 1 | | | | | |
| Common Moorhen | <i>Gallinula chloropus</i> | 2 | | | | | |
| American Coot | <i>Fulica americana</i> | 25 | | 150 + | | 10 | 22 |
| Killdeer | <i>Charadrius vociferus</i> | 6 | | 2 | 34 | 7 | 5 |
| Greater Yellowlegs | <i>Tringa melanoleuca</i> | | | | | 1 | |
| Common Snipe | <i>Gallinago gallinago</i> | | | | | 1 | |
| Ring-billed Gull | <i>Larus delawarensis</i> | | | 10 | | | |
| Rock Dove | <i>Columba livia</i> | | 10 | | 10 | | 3 |
| Mourning Dove | <i>Zenaidura macroura</i> | 8 | | 10 + | | | |
| Short-eared Owl | <i>Asio flammeus</i> | | | | | | 1 |
| Anna's Hummingbird | <i>Calypte anna</i> | 1 | | | | | |
| Rufous Hummingbird | <i>Selasphorus rufus</i> | | | | | | 1 |
| Belted Kingfisher | <i>Ceryle alcyon</i> | 1 | | | | | 1 |
| Northern Flicker | <i>Colaptes auratus</i> | | 5 + | 2 | 12 | 8 | 2 |
| Black Phoebe | <i>Sayornis nigricans</i> | 2 | 2 | 1 | | | |
| Western Kingbird | <i>Tyrannus verticalis</i> | | | | | | 3 |
| Horned Lark | <i>Eremophila alpestris</i> | 25 + | | 20 + | | | 2 |
| Barn Swallow | <i>Hirundo rustica</i> | | | | 11 | 3 | 2 |
| Cliff Swallow | <i>Hirundo pyrrhonota</i> | | | | | | 10 |
| Scrub Jay | <i>Aphelocoma coerulescens</i> | 5 + | | 5 + | 10 | 9 | 18 |
| American Crow | <i>Corvus brachyrhynchos</i> | | 20 + | | 11 | 6 | 14 |
| Marsh wren | <i>Cistothorus palustris</i> | 2 | | 2 | | 4 | 2 |

Table E-1. Wildlife Species Observed During Field Surveys of the Brookside Project Area, San Joaquin County, California

| SPECIES ^a | | | | | | | |
|--------------------------------------------------|----------------------------------|-------|-------|-------|-----|------|-----|
| COMMON NAME | SCIENTIFIC NAME | 11/18 | 1/21 | 2/19 | 3/4 | 3/17 | 4/6 |
| Ruby-crowned Kinglet | <i>Regulus calendula</i> | 4 | 3 + | 2 | | | |
| American Robin | <i>Turdus migratorius</i> | | | 5 + | 15 | 3 | 2 |
| Northern Mockingbird | <i>Mimus polyglottos</i> | 5 | | 1 | 7 | 6 | 8 |
| Water Pipit | <i>Anthus spinoletta</i> | 25 + | 20 + | 3 | | 1 | 15 |
| Loggerhead Shrike | <i>Lanius ludovicianus</i> | | | 1 | | | |
| European Starling | <i>Sturnus vulgaris</i> | | 100 + | 100 + | 120 | 30 | 20 |
| Yellow-rumped Warbler | <i>Dendroica coronata</i> | | 2 | 2 | 9 | 10 | 7 |
| Rufous-sided Towhee | <i>Pipilo erythrophthalmus</i> | | | 1 | 2 | 5 | 9 |
| Brown Towhee | <i>Pipilo fuscus</i> | | | | | 1 | 1 |
| Savannah Sparrow | <i>Passerculus sandwichensis</i> | | | 5 + | 1 | 5 | 130 |
| Song Sparrow | <i>Melospiza melodia</i> | 10 + | 15 + | 5 + | 27 | 40 | 56 |
| Lincoln's Sparrow | <i>Melospiza lincolni</i> | 10 + | 10 + | | | 2 | |
| Golden-crowned Sparrow | <i>Zonotrichia atricapilla</i> | 25 | 10 + | 10 + | 43 | 4 | 7 |
| White-crowned Sparrow | <i>Zonotrichia leucophrys</i> | 10 + | 10 + | 15 + | 260 | 60 | 64 |
| Dark-eyed Junco | <i>Junco hyemalis</i> | 20 | | 10 + | 2 | | 1 |
| Red-winged Blackbird | <i>Agelaius phoeniceus</i> | 150 + | 100 + | 25 + | 11 | 20 | 80 |
| Western Meadowlark | <i>Sturnella neglecta</i> | | 25 + | | 115 | 32 | 18 |
| Brewer's Blackbird | <i>Euphagus cyanocephalus</i> | | 15 + | | 80 | 9 | 23 |
| Brown-headed Cowbird | <i>Molothrus ater</i> | | | | | | 10 |
| House Finch | <i>Carpodacus mexicanus</i> | | 25 + | 20 + | 85 | 55 | 18 |
| Lesser Goldfinch | <i>Carduelis psaltria</i> | | | | | | 3 |
| House Sparrow | <i>Passer domesticus</i> | | | 10 + | | | |
| MAMMALS | | | | | | | |
| California Ground Squirrel | <i>Spermophilus beecheyi</i> | + | + | + | | + | |
| Coyote | <i>Canis latrans</i> | + | | | | | |
| Raccoon | <i>Procyon lotor</i> | + | + | + | | | |
| Desert Cottontail | <i>Sylvilagus auduboni</i> | + | + | + | + | + | + |
| Black-tailed Hare | <i>Lepus californicus</i> | + | + | + | + | + | + |
| Muskrat | <i>Ondatra zibethicus</i> | + | | + | + | | |
| REPTILES | | | | | | | |
| Western Pond Turtle (seen along Calaveras River) | <i>Chelonia marmorata</i> | + | | | | + | |
| Western Fence Lizard | <i>Sceloporus occidentalis</i> | + | | + | | | |
| Gopher Snake | <i>Pituophis melanoleucus</i> | | | + | | | |
| AMPHIBIANS | | | | | | | |
| Bullfrog | <i>Rana catesbeiana</i> | + | | | | | |

^a Mammals, reptiles, and amphibians were only recorded as present or absent during the field surveys.

Direct observations and signs (e.g., tracks, scat, and burrows) were used to detect these species.

^b Sited as flyover only.

E-1). This 1,200-acre site has increased importance to wildlife because most of the surrounding land has already been converted to residential, commercial, and industrial uses. The project site also serves as a buffer between developed areas and farmlands to the west which attract many migratory waterfowl (Messersmith pers. comm.).

AGRICULTURAL FIELDS

Setting

About 1,044 acres (91 percent) of the project site was converted in the past to agricultural production (Figure E-1).

Vegetation

Between 1984 and 1987, the agricultural fields were planted with safflower, corn, alfalfa, sugar beets, wheat, and pasturage (Huber pers. comm.). Most land west and south of the project site also supports agricultural uses. Agricultural habitats of the project area do not support significant botanical attributes, due to the absence of natural habitats and dominance by non-native plant species (see Appendix D).

Wildlife

Although wildlife generally prefer natural habitats, pasturelands and croplands provide some habitat value. Wheat, safflower, sugar beets, corn, alfalfa, and pastures offer important foraging and resting areas for animals like turkey vultures, black-shouldered kites, red-tailed hawks, northern harriers, ring-necked pheasants, horned larks, water pipits, western meadowlarks, loggerhead shrikes, California ground squirrels, black-tailed hares, and coyotes (see Appendix E). In general, row crops such as sugar beets are least valuable as wildlife habitat, but do provide food and cover for some birds and mammals.

The wildlife survey suggested that few waterfowl use agricultural fields of the project area. It is possible that more waterfowl visit this area during extremely wet winters (Kohl pers. comm.), but high concentrations are unlikely due to proximity to development and a lack of permanent wetland habitat. Agricultural fields in the project area offer little habitat for ground-dwelling reptiles and amphibians, because they are disturbed frequently by plowing and other agricultural activities.

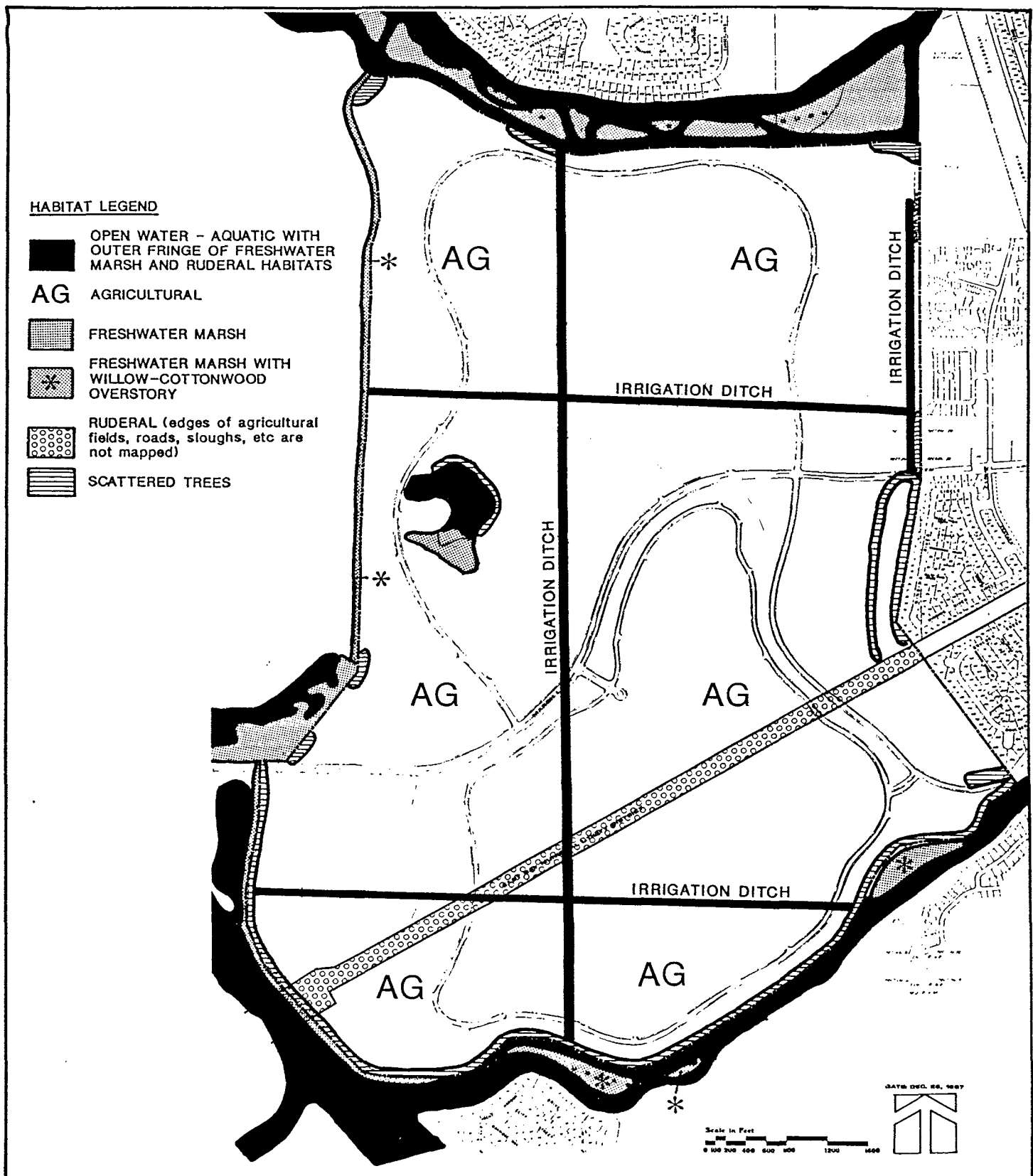


FIGURE E-1. HABITAT TYPES OF THE BROOKSIDE SITE

Project Impacts and Mitigation Measures

Vegetation

Impact: Conversion of Agricultural Lands to Urban Development

From a strictly vegetational standpoint the loss of agricultural lands is a less-than-significant impact because the non-native vegetation does not support any special-status plant species or other important botanical attributes.

Mitigation Measure

- o None required.

Wildlife

Impact: Loss of Foraging and Roosting Habitat

Herons, raptors, ring-necked pheasants, small numbers of waterfowl and other wildlife would lose foraging and roosting habitat as a result of the construction at the Brookside project. Development would be a significant adverse impact to wildlife due to the large size of the project area (1,200 acres) and because cumulative losses of this habitat in the Stockton area have created a critical shortage of agricultural habitats for birds and other wildlife (Nakaji pers. comm.).

Mitigation Measures

- o See mitigation for "Cumulative Impacts" below.

FRESHWATER MARSH

Setting

Freshwater marshes can develop in permanent or semipermanent, slow-moving or ponded water in water depths of less than 5 feet. Irrigation ditches within the project area support freshwater marshes (Figure E-1). Until its recent dewatering and grading, the borrow pit supported fresh water marsh vegetation. The project area has about 5 miles of major irrigation ditches.

Extensive freshwater marsh habitat is also located adjacent to the project area along the Calaveras River and Ten Mile and Fourteen Mile Sloughs. Freshwater marshes adjoin ruderal, open water/aquatic, and agricultural habitats in the project area.

Vegetation

Freshwater marsh vegetation is characterized by dense stands of emergent aquatic vegetation with terrestrial wetland vegetation along the marsh edges. In the project area, freshwater marshes are dominated by dense bulrush stands forming 3- to 5-foot-tall thickets interspersed with occasional cattail patches. These two dominant emergent aquatic species associate with a relatively diverse assemblage of grasses and forbs including verbena, smartweed, water horehound, willow herb, watergrass, paspalum, common reedgrass, mugwort, ragweed, umbrella sedge, and pacific rush. Freshwater marshes of the project area's canals and borrow pit are structurally and floristically similar to natural marsh communities; the primary differences are the narrow width of the marshes along the canals and the effects of periodic disturbance, which allow certain non-native species to flourish.

The size and species composition of freshwater marshes in the project area vary with the depth and cross-sectional shape of the irrigation ditches and frequency of past disturbances. Narrow, steep-sided canals are most common in the project area; these canals support narrow bands of marsh vegetation or are lined by ruderal vegetation (described below). In contrast, the Smith Levee Slough has more extensive marshes due to its shallow water, wide bottom, and gently sloping sides.

The 11.5-acre borrow pit previously supported about 4.0 acres of freshwater marsh, forming a large cattail stand at the south end of the pond and a narrow band around the pond margin. An area of slightly higher ground at the south end of the pond had dense, 2- to 4-foot-tall herbaceous vegetation dominated by creeping wild rye, umbrella sedge, paspalum, fat hen, and dock.

Tidally influenced sloughs and rivers adjacent to the project area have extensive freshwater marshes. The tidal sloughs and levees support fewer terrestrial wetland species than marshes inside of the levees, but could support some species not found in the project area. For example, Mason's lilaeopsis, a special-status plant, could occur in tidal marshes adjacent to the project area, but would not occur in the nontidal project area wetlands.

Tidal marshes along the waterside of the levee surrounding the project site were not investigated for the initial study or EIR because they would not be impacted by the proposed project. A previous environmental study (R. C. Fuller Associates 1983) covering levee improvement needs for the Project area identified and adopted an alternative that would avoid impacting the sensitive marsh habitat.

Marshes in Fourteen Mile Slough have a spotty, woody overstory of buttonbush and willow and therefore correspond to the early development phases of the tule island habitat described by the DFG/USFWS (1980).

Freshwater marshes are a significant botanical resource because of their current scarcity in the San Joaquin Valley compared with their historic extent and their importance to dependent plant species including the special-status plants, California hibiscus, slough thistle, and Sanford's

sagittaria. For this reason, NDDB monitors the number and condition of known occurrences of freshwater marshes.

Freshwater marshes that have developed in disturbed sites of the project area are valued because: 1) most of the remaining marshes occur in previously disturbed areas; natural marshes are so uncommon that they cannot provide adequate area to maintain wildlife populations, and 2) characteristic freshwater marsh species are capable of colonizing previously disturbed sites and subsequently developing a relatively natural habitat. Therefore, although the marshes in the project area occupy narrow, disturbed manmade channels and were formerly a borrow pit, they still retain important biological values and functions.

Wildlife

Freshwater marshes in the project area, including those along the irrigation canals and formerly in the borrow pit, provide important foraging habitat for fish-eating bird species such as American bitterns, great blue herons, great egrets, and belted kingfishers. These aquatic habitats also attract mallards, American coots, common moorhens, and other water birds. Several species such as Virginia rails, marsh wrens, common yellowthroats, and song sparrows nest in cattails and other emergent vegetation in these freshwater marshes.

Raccoon tracks were noted along the canals and near the borrow site during the field surveys, and muskrats probably also occur in freshwater marsh habitats of the project area. Deer mice, California voles, and house mice (introduced), and a variety of other small mammals probably also frequent the freshwater marsh habitats of the project area.

Reptiles such as giant garter snakes (see "Sensitive Species" below) and amphibians, including Pacific treefrogs and bullfrogs (introduced), may frequent these freshwater marsh habitats.

Project Impacts and Mitigation Measures

Vegetation

Impact: Elimination of Freshwater Marshes from Project Site

The freshwater marshes of the project area would be eliminated by the proposed project. Recent levee upgrading has disturbed or eliminated the marsh fringe on the water side of the levee along Fourteen Mile Slough.

The elimination of freshwater marsh habitats along canals and at the former borrow pit is considered a significant impact due to their biological values and functions, and their relative scarcity in the immediate region and the San Joaquin Valley. Historically, 1.5 million acres of marsh habitat

existed in the San Joaquin Valley (Medieros pers. comm.). One to two percent of the valley's freshwater marshes are believed extant today (Reiner pers. comm.).

Mitigation Measures

- o Project applicant should consider reconfiguring the project plan to avoid the loss of freshwater marsh habitats found in central irrigation ditches. The applicant should also provide offsite in-kind compensation for loss of the borrow pit, creating a substitute wetland resource that satisfies the criterion of regulatory agencies.
- o Enhance the golf course ponds to support freshwater marshes.
- o Offsite compensation could develop a site capable of supporting freshwater marsh vegetation. An optimal site would have fine-grained soils and be structurally capable of retaining ponded surface water for most or all of the year. The most important consideration would be to select a site with sufficient water available on a year-round basis. Possible water sources include surface stormwater runoff, groundwater upwelling, or groundwater pumping.
- o Offsite marsh restoration or creation could entail vegetation plantings, improving hydrologic conditions, preventing future degradation or undertaking other activities that could improve the site's quality and ability to support freshwater marshes.
- o Offsite marsh enhancement or development requires that the mitigation site be permanently set aside as nondevelopable open space to ensure that significant impacts are reduced to less-than-significant levels.
- o The project applicant, in consultation with DFG and USFWS, should determine the amount of offsite acreage compensation required to fully mitigate the loss based on an objective valuation of the net amount of resource eliminated by the project.

Wildlife

Impact: Loss or Degradation of Freshwater Marsh Habitat on Project Site

Three types of potentially significant direct impacts to freshwater marshes could or already have resulted from the proposed project, including: 1) elimination of the wildlife habitats provided by the freshwater marsh at the borrow pit and along irrigation ditches in the project area (Figure E-1); 2) release of peak period stormwater from lakes containing some concentration of hazardous compounds (e.g., oils, solvents, and other household chemicals) into storm drainage systems that flow into Fourteen Mile Slough and the Calaveras and San Joaquin Rivers; and 3) construction activity disturbance of wildlife living in freshwater marsh habitats outside of

the project area. These impacts would be significant if listed, or if candidate species such as the giant garter snake and California tiger salamander are found within the project area.

Another impact would be the disturbance of wildlife species and their habitats through the presence of humans and their pets (e.g., dogs and house cats) along existing canals and freshwater marsh habitats.

Mitigation Measures

- o Refer to mitigation measures listed under vegetation above.
- o (See mitigation for cumulative impacts below).

OPEN WATER-AQUATIC

Setting

Irrigation canals and the borrow pit have slow-moving or ponded water that provides habitat for various aquatic plant and wildlife species (Figure E-1). Irrigation ditches have narrow bands of this habitat, while the borrow pit had 7.5 acres of open water pond. In the project area, freshwater marshes and ruderal uplands adjoin the open water/aquatic habitat in the project area.

Vegetation

Open water-aquatic habitats are dominated by floating and submerged aquatic plants; typical species include pondweed, duckweed, elodea, yellow water weed, water fern, marsh pennywort, and water milfoil. In the project area, yellow water weed is most common, forming nearly pure mats. Aquatic vegetation was observed in the former borrow pit, but the amount and varieties could not be determined from the pond's bank.

Wildlife

Open water portions of the canals and the former borrow site provide habitat for water birds such as pied-billed grebes, great egrets, snowy egrets, American coots, mallards, green-winged teal, bufflehead, ring-necked ducks, canvasbacks, cinnamon teal, gadwalls, and American wigeon. These species forage on submerged aquatic plants and associated invertebrates and loaf in open water habitats of the project area.

Project Impacts and Mitigation Measures

Vegetation

Impact: Loss of Open Water Aquatic Habitat

From a vegetation standpoint, the elimination of the open water aquatic habitat at the former borrow pit is a less-than-significant impact due to its local and regional abundance and absence of any significant botanical attributes.

Mitigation Measures

- o None required.

Wildlife

Impact: Loss of Open Water Habitat

Loss of the open water habitats in the canals and former borrow pit in the project area would be detrimental to wildlife. This impact would be significant because elimination of these habitats would result in loss of loafing and feeding areas for waterbirds and would coincide with the loss of freshwater marsh habitats in the project area.

Mitigation Measures

- o The creation of a 47.6-acre lake would mitigate some impacts associated with the loss of open water habitat, as existing lakes in other Grupe developments do attract some openwater species such as American coots, ruddy ducks, and buffleheads. However, the artificial character of the proposed lake (e.g., a lack of emergent vegetation or other cover), and its proximity to intensive residential development suggests that it will have limited wildlife value. Thus, creation of the lake would not reduce this impact to a less-than-significant level.
- o (See mitigation for cumulative impacts below).

RUDERAL

Setting

The upland edges of roads, canals, and agricultural fields are routinely disturbed by agricultural operations and maintenance (unmapped). These disturbed areas support "weedy" vegetation, forming a "ruderal" habitat.

The EBMUD right-of-way also supports a ruderal habitat by virtue of the constant disturbance required to limit vegetation development.

Vegetation

The ruderal habitat supports a mix of weedy plant species dominated by grasses but with significant forb cover. Common species include salt grass, Johnson grass, paspalum, black mustard, yellow-star thistle, ragweed, chickory, bindweed, and sweet fennel. Ruderal habitats also support occasional Himalaya berry thickets and scattered ornamental trees.

From a strictly botanical perspective, ruderal habitats have little importance because non-native, introduced plant species dominate the vegetation.

Wildlife

Weedy vegetation growing along the edges of roads, canals, and agricultural fields provides cover and foraging habitat for bird species such as ring-necked pheasants, California quail, Lincoln's sparrows, savannah sparrows, dark-eyed juncos, white-crowned sparrows, and golden-crowned sparrows. Small mammals such as deer mice and house mice probably also frequent these habitats.

Project Impacts and Mitigation Measures

Ruderal habitats will be eliminated by the project except possibly along the levees surrounding the project site.

Vegetation

Impact: Loss of Ruderal Vegetation

The loss of ruderal vegetation is a less-than-significant impact due to its low value, dominance by non-native species, and local and regional abundance.

Mitigation Measures

- o None required.

Wildlife

Impact: Loss of Ruderal Habitat

The loss of ruderal vegetation along canals, the borrow pit, and agricultural fields in the project site would be a less-than-significant impact

to wildlife because extensive amounts of ruderal habitat are present along Fourteen Mile Slough and the Calaveras and San Joaquin Rivers adjacent to the site. Loss of ruderal vegetation near freshwater marshes could be significant if giant garter snakes were found within the project area (see "Sensitive Species" below).

Mitigation Measures

- o None required if the giant garter snake is not present.

SCATTERED TREES

Setting

House sites and levees have scattered ornamental and native trees which were either planted or "volunteered" (Figure E-1). The scattered tree habitat has a ruderal understory vegetation, described above except where landscapes are maintained around dwellings.

Vegetation

The species composition and density of trees within the scattered tree habitat varies. Most trees were planted English walnuts; the Calaveras River levee supports a nearly continuous row of this species. House sites have a mix of ornamental trees including walnuts, eucalyptus, mulberry, figs, and palms. Where seepage provides sufficient water on the land side of levees, occasional native riparian species such as willow, Oregon ash, and cottonwood trees are scattered. The levee along the east edge of the project area has several large cottonwoods. Young growth willows, buttonbush, and cottonwoods are scattered on levees adjacent to Buckley Cove and Fourteen Mile Slough, and along the east side of the borrow pit.

Wildlife

Native and ornamental trees growing near houses and along levees are used for perching and nesting by raptors such as red-tailed hawks, black-shouldered kites, and American kestrels. These trees could also be used for nesting by Swainson's hawks (see "Sensitive Species" below), but the presence of this species on the project site has not been confirmed (Schlorff pers. comm.). Swainson's hawks were not observed during the field surveys, but only the last survey coincided with the occurrence of this migratory species in California.

Impacts and Mitigation Measures

Vegetation

Impact: Loss of Trees

Most native and ornamental trees will be eliminated, but some may be retained along the levees. The loss of trees in the project area is considered a less-than-significant impact. The applicants are also proposing tree plantings as part of a golf course development that could further reduce this impact.

Mitigation Measures

- o None required.

Wildlife

Impact: Loss of Trees

Loss of scattered trees near houses and along the levees would probably be a less-than-significant impact to wildlife because larger stands of native willows and cottonwoods exist near the project area on the Calaveras and San Joaquin Rivers. Ornamental trees in the project area have less value to wildlife than native tree species, and many ornamental trees will ultimately be planted as part of the proposed project. Loss of scattered trees could be a significant impact to wildlife if a Swainson's hawk nest were found in the project area (see "Sensitive Species" below).

Mitigation Measures

- o None required if Swainson's hawks do not nest in the project area.

SPECIAL STATUS SPECIES

Setting

Special Status Plant Species

In this report special-status plants are defined to include:

- o State of California rare, threatened, and endangered species (DFG 1987),

- o federally listed, proposed, or candidate threatened or endangered species (50 FR 39526-39584; September 27, 1985), and
- o California Native Plant Society (CNPS) rare and endangered species (Smith and York 1984).

A list of special-status plant species with a potential to occur in the project site was developed. Species were included on this list if reported from the project area or in the vicinity, and if they are associated with the habitat types existing in the project area. The following information sources were used to develop this list: NDDDB (1987), CNPS (1985), Smith and York (1984), and the file information of Jones & Stokes Associates.

The record search indicated that no special-status plant species have been reported from the project area (NDDDB 1987). However, four special-status plant species could potentially occur in habitats presently existing in the project area: the California hibiscus, delta tule pea, slough thistle, and Sanford's sagittaria. These species are listed in Table E-2 with a summary of their status, distribution, and habitat associations. Special-status plants reported from vernal pool and alkaline meadow habitats in the region (e.g., Sacramento orcuttia and palmate-bracted bird's beak) are not included in Table E-2 because potential habitat does not exist in the project area.

California Hibiscus. The California hibiscus is reported from 69 populations in the Central Valley (Bittman pers. comm.). The freshwater marshes of the project site provide suitable habitat, but no populations were detected during the November 18, 1987 field survey. Although the California hibiscus flowers during late summer, postfruiting plants can be located and identified throughout fall and winter unless they are removed by winter flooding.

Field surveys of the project site were adequate during searches for the species because potential habitat had not been disturbed by recent flooding. No evidence of the California hibiscus was detected. The past disturbance and channelization of irrigation ditches and young age of the borrow pit reduce the probability of this species occurring in the project area and could account for its absence at the site.

Delta Tule Pea. The delta tule pea has been reported from 16 sites (Bittman pers. comm.), but recent surveys in the Delta and Sacramento Valley have identified several new populations (Dains pers. comm. and California Reclamation Board 1987). The banks of the various irrigation canals and adjacent ruderal uplands were considered potential habitat. No delta tule pea was found in the project area, probably due to the high level of disturbance to its potential habitat.

Slough Thistle. Reported from a few sites in the San Joaquin Valley, this species could occur within freshwater marshes and adjacent seasonally flooded wetlands. No populations were found within the project area.

Table E-2. Special-Status Plant Species With a Potential to Occur in the Brookside Project Area

| Species | Status ^a | Geographic Range | Habitat Associations |
|-----------------------------------------------------------------------------------------|---------------------|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| <u>Hibiscus californicus</u> California hibiscus (Malvaceae - Mallow Family) | C2/ 1b | Central Valley from Butte to San Joaquin County and adjacent Delta areas. | Riparian habitats with freshwater marsh vegetation in areas with slow water velocities such as canals, sloughs, ponds, oxbows, etc. |
| <u>Lathyrus jepsonii</u> spp. Delta tule pea (Fabaceae - Pea Family) | C2/ 1b | Delta and Central Valley from Butte to Tulare Counties. | River and canal banks in brackish and freshwater marshes and riparian woodlands, at or above the low mean water level or tidal zone margin. |
| <u>Sagittaria sanfordii</u> Sanfords sagittaria (Alismataceae - Arrowhead Family) | C2/ 1b | Widespread but infrequent, reported from Del Norte, Fresno, Sacramento, Santa Barbara, and Ventura Counties. | Flooded sloughs and sluggish streams with silty or muddy substrate, associated with freshwater marsh vegetation. |
| <u>Cirsium crassicaule</u> Slough thistle (Asteraceae - Sunflower Family) | C2/ 1b | San Joaquin Valley from the Delta south to Lathrop | Shallow water and seasonally flooded sites and uplands associated with freshwater marsh and adjacent ruderal vegetation. |

^a Status:

Federal status according to Federal Register Vol. 50:39526-39584.

C2 = A "Candidate" species under review for federal listing. "Category 2" includes species for which USFWS presently has some information indicating that "proposing to list them as endangered or threatened species is possibly appropriate," but for which further biological research and field study is usually needed to determine biological vulnerability and threats.

Note: "Category 2" species are not necessarily less rare or less threatened than "Category 1" species. The distinction relates to the amount of data available and is therefore administrative rather than biological.

CNPS status according to Smith and York (1984).

1b = Plants considered rare or endangered by CNPS.

Sanford's Sagittaria. This species was reported from three widely scattered historic populations by NDDB (Bittman pers. comm.), but recent information obtained from C. Turner by Newton (pers. comm.) indicates the species has been collected at a number of additional sites throughout California. An historic collection from the City of Sacramento is the nearest reported locality to the project area.

Open mud flats and sparsely vegetated freshwater marshes were considered potential habitat, but no populations were found. As indicated above, the species was not expected to occur because of the extent of past disturbances to marsh habitats in the project area.

Special Status Wildlife Species

Special-status wildlife species include those on the following lists:

- o federal-listed, proposed, and candidate threatened and endangered species (50 FR 37958-37967; September 18, 1985);
- o California listed and candidate threatened and endangered species (California Department of Fish and Game 1987b);
- o California fully protected species, which are not listed as endangered or threatened but are protected by law in California (California Department of Fish and Game 1987); and
- o other species of special concern to the DFG (Remsen 1978, Williams 1986).

No federal- or state-listed threatened or endangered wildlife species were observed by Jones & Stokes Associates biologists during the field survey. The NDDB search and contacts with DFG and USFWS personnel, however, indicated the occurrence of several special-status wildlife species near the project area that were not identifiable during the field survey and could possibly occur in the project area (Table E-3).

Giant Garter Snake. This species frequents freshwater marshes and other wetlands from Fresno to Butte County (Hansen and Brode 1980), and has high potential to occur along canals in the project site (Brode pers. comm.). Field surveys for this species should be conducted during mid-April to mid-June along any canals that would be eliminated or disturbed during project construction.

California Tiger Salamander. California tiger salamanders frequent still waters of ponds, streams, vernal pools, and open grasslands. Since they are probably nocturnal for most of the year (Storer 1925), California tiger salamanders are most often found under objects near water or crawling at night following heavy rains (Stebbins 1985). They are easiest to detect by seining water for their larvae in early spring (Brode pers. comm.). This species has been recorded in the Stockton area, but the lack of heavy rains prevented surveying for the species in the project site. Some potential

Table E-3. Occurrence of Special-Status Wildlife Species in the Vicinity of the Proposed Brookside Development Site, San Joaquin County

| Species | Legal ^a Status | Locations | Source |
|----------------------------------------------------------------------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| Giant garter snake (<u>Thamnophis couchi gigas</u>) | ST,C2 | a. Observed near the project area on 8-mile Road b. Suitable habitat exists in the project area; occurrence of this species on the site is considered likely | NDDB 1987 Brode pers. comm. |
| California tiger salamander (<u>Ambystoma Tigrinum californiense</u>) | C2 | Observed near the project area at Victory Park in Stockton | NDDB 1987 |
| Swainson's hawk (<u>Buteo swainsoni</u>) | ST,C2 | Observed near the project area; use of the site for foraging and roosting is likely, and nesting at the site is possible | NDDB 1987, Schlorff pers. comm. |
| Northern harrier (<u>circus cyaneus</u>) | CSC | Observed in the project area; probably nesting | JSA field surveys |
| California black rail (<u>Laterallus jamaicensis coturniculus</u>) | ST,C2 | One bird was found dead in Stockton in 1959; apparently no recent records. occurrence in the project area is unlikely but some potential habitat exists on Fourteen Mile Slough, Calaveras River, and San Joaquin River. | NDDB 1987 |
| Greater Sandhill crane (<u>Grus canadensis</u>) | CSC | Probable winter use of the project area for foraging and roosting | JSA field surveys |

^aFederal = U. S. Fish and Wildlife Service 1985.

FE = Listed as "Endangered" under the federal Endangered Species Act.

FT = Listed as "Threatened" under the federal Endangered Species Act.

C2 = A "Candidate" species under review for federal listing. "Category 2" includes species for which the USFWS presently has some information indicating that "proposing to list them as endangered or threatened species is possibly appropriate," but for which further biological research and field study is usually needed to determine biological vulnerability and threats.

Note: "Category 2" species are not necessarily less rare or less threatened than "Category 1" species. The distinction relates to the amount of data available and is therefore administrative rather than biological.

State = California Department of Fish and Game 1985.

SE = Listed as "Endangered" under the state Endangered Species Act.

ST = Listed as "Threatened" under the state Endangered Species Act.

CP = California "fully protected species"; individuals may not be possessed or taken at any time.

CSC = Considered a "species of special concern" by the California Department of Fish and Game (Remsen 1979).

giant garter snake habitat, however, does exist along the irrigation ditches at this site.

Swainson's Hawk. The scattered trees (both native and ornamental) growing along levees and near houses in the project area provide potential nesting habitat for Swainson's hawks (Schlorff pers. comm.). This species winters in South America (American Ornithologists' Union 1983), and therefore it could not be searched for during most of the site surveys. The final field survey (April 6) coincided with the period of Swainson hawk occurrence in California and none was seen.

Northern Harrier. Although this species does not have a state- or federal-listed status, it is considered a species of special concern by the DFG (Remsen 1979). Northern harriers are common residents of the project area and were observed frequently during the field survey. In addition to using the project area for foraging and roosting, it is likely that northern harriers also use the project site for nesting.

California Black Rail. This species occurs primarily in tidal salt marshes, but it also occasionally frequents brackish and freshwater areas (Grinnell and Miller 1944). In 1959, a dead black rail was found in Stockton (Table E-3), but the species has not been recorded at the project site. The species is not expected within the project area because extensive marsh habitats are lacking. Suitable black rail habitat exists along Fourteen Mile Slough and the San Joaquin and Calaveras Rivers adjacent to the project area.

Sandhill Crane. Sandhill cranes are considered a species of special concern by the DFG (Remsen 1979). They make widespread use of agricultural areas and freshwater marshes around Stockton (Mapes pers. comm.). This species was not observed at the project site during the field surveys.

Project Impacts and Mitigation Measures

Vegetation

Impact: Loss of Special Status Plant Species

No special status plant species were identified on the project site. This impact is considered less than significant.

Mitigation Measures

- o None required.

Wildlife

Impact: Loss of Special Status Wildlife Species

Giant Garter Snake. Removal of freshwater marsh or ruderal vegetation would be a significant adverse impact if surveys indicate that this species occurs in the project site (Brode pers. comm.).

California Tiger Salamander. Removal of freshwater marsh habitats would be a significant adverse impact if surveys indicate that this species occurs in the project site (Brode pers. comm.).

Swainson's Hawk. This species is not known to nest in the project area, but a loss of potential foraging habitat could result from this project (Schlorff pers. comm.). This impact is expected to be less than significant because ample foraging habitat exists near the project area.

Northern Harrier. Loss of nesting and foraging habitat for northern harriers would contribute to a cumulative adverse impact to this species.

California Black Rail. Impacts to this species would probably not occur because suitable habitat is lacking within the project site.

Sandhill Crane. Loss of agricultural fields and freshwater marshes in the project site contribute to a cumulative significant impact on this species because habitat conversions from agricultural fields to development in the Stockton area have become widespread (Nakaji pers. comm.). This impact is considered less than significant, however, because sandhill cranes were not observed at the project area during the field surveys.

Mitigation Measures

- o Several options exist for mitigating impacts to special-status wildlife species to less-than-significant levels. These are listed in order of preference for specific species below.

Giant Garter Snake

- o If surveys reveal the presence of this species in the project area, preserve freshwater marsh and adjacent ruderal habitats.
- o If the borrow pit and canals are retained, but enlarged or otherwise modified, they should be earthen-lined, and a 30-foot-wide vegetation berm should be retained around the pit and on at least one side of the canals to provide habitat for giant garter snakes.
- o If giant garter snake habitat is eliminated, mitigation should include enhancement of an offsite mitigation area for this species. (See mitigation for cumulative impacts below).

California Tiger Salamander

- o If surveys reveal the presence of this species in the project area, preserve freshwater marsh habitats.
- o If all natural marsh areas in the project area are removed, creating new wetland habitats at an offsite mitigation parcel would probably constitute adequate mitigation for this species.

Swainson's Hawk

- o Avoid any active nesting sites (including a 100-foot-radius buffer zone), if any are found in the future.

Northern Harrier

- o Enhance natural marshes at an offsite mitigation parcel.

California Black Rail

- o None required.

Sandhill Crane

- o None required.

Cumulative Impacts and Mitigation Measures

Impact: Conversion of 4,625 acres of Wildlife and Vegetation Habitat to Urban Uses

Conversion of approximately 4,625 acres of agricultural fields, freshwater marsh, open-water aquatic, and scattered tree habitats to residential, commercial, and other urban uses proposed for development in Stockton would contribute to the regionwide and statewide losses of these habitats. In the immediate vicinity of the proposed project area, most surrounding lands have already been converted to residential and commercial uses. Individual habitat losses may not be critical to wildlife, but the development of thousands of acres will result in the eventual loss of wildlife values for San Joaquin County. These cumulative losses are significant adverse impacts to vegetation and wildlife.

Mitigation Measures

If enhancement of existing habitats onsite is not a feasible mitigation option, then the County should consider implementing a mitigation bank as described below.

- o The significant cumulative losses of vegetation and wildlife habitat in San Joaquin County could be mitigated to less-than-significant levels if a "mitigation bank" were established by the County to offset habitat losses created by individual projects. Developers could be

required to contribute funds to the mitigation bank for use in establishing offsite mitigation lands. The amount of offsite land (and hence, money contributed to the bank) would be proportional to the habitat value and acreage of land eliminated by a project, and the maintenance cost of the mitigation parcel. Large projects, such as the one proposed herein, would have the option of attaining their habitat compensation goals by retaining portions of their property as permanent open space, contributing funds to a mitigation bank, or by a combination of these options.

- o The mitigation bank would be operated in a manner similar to a "bedroom tax" where developers would be assessed specific per unit fees at the time permits are granted and initial project construction begins. Since it is the loss of habitat through grading and site preparation that produces most of the vegetation and wildlife impacts, fees should be assessed at the grading phase.
- o Funds generated should be placed in an interest-bearing account until sufficient money is available to purchase and enhance a large, contiguous block of natural habitat with wetland and upland vegetation as permanent open space. Alternatively, the funds could be used to purchase the development rights and create open space easements on privately owned land that might be zoned for development. Several nonprofit conservation groups or trusts and state agencies (e.g., the Wildlife Conservation Board) might be interested in helping to fund the initial purchase of a preserve to overcome the potential lag times between contributions of funds and actual land purchases. Such delays would create problems because: 1) appreciating land values lessen the purchasing power of contributed money, 2) the location and amounts of available land decrease through time, and 3) wildlife dependent on large blocks of open land may not have available habitat in the interim.
- o These preservation areas should be situated in farmlands and encompass natural marshes in western San Joaquin County, where open space of this sort is limited and rapidly diminishing. A large, contiguous block of land, protected in perpetuity as nondevelopable open space, is required to reduce the significant cumulative impacts of the project and others to less-than-significant levels. Selecting the mitigation area requires a regional planning effort with input from local, state, and federal agencies to determine the location of high-value natural habitat where future development could occur. Long-term management and enhancement activities for the mitigation lands could be accomplished in cooperation with the USFWS, DFG, or possibly a private local trust or land conservancy.

AQUATIC RESOURCES

Setting

General

The proposed project site is located in the Sargent-Barnhart Tract near the eastern edge of the Sacramento-San Joaquin Delta. The eastern portion of the Delta is characterized by a complex pattern of rivers, dead-end sloughs, and connecting cross-channels covering thousands of acres. Numerous tracts and islands, ranging from a few acres to several thousand, also are found in the eastern Delta.

The project site is surrounded on three sides by Delta waters: Ten Mile Slough on the west, Fourteen Mile Slough on the North, and the San Joaquin and Calaveras Rivers on the southwest and southeast, respectively. Several small drainage canals also are found within the project site. During our site visit Ten Mile Slough was found to be dry.

The waters surrounding the proposed project site represent several major aquatic habitat types:

- o large, deep shipping channels (Stockton Deep Water Channel);
- o open rivers (San Joaquin and Calaveras Rivers);
- o dead-end sloughs, where only one end of the channel connects to another channel (Fourteen Mile and Ten Mile Sloughs); and
- o small embayments, connected to the main channel by one opening (Buckley Cove Marina).

All of these aquatic habitats support numerous resident and anadromous fish species; however, dead-end sloughs are typically the most productive habitat type in the Delta, particularly for resident fishes.

Fishery Resources

The Delta provides essential habitat for numerous fish species; most of California's anadromous sport fishes and resident native fishes are abundant only within Delta waters (Department of Fish and Game/U. S. Fish and Wildlife Service 1980).

The following information on fish species abundance and composition in the waters surrounding the proposed project site was supplied by the DFG.

The waters surrounding the project site support numerous resident and anadromous fish in a great diversity of aquatic habitats. Fourteen Mile

Slough provides valuable dead-end slough habitat for numerous fish species dominated by members of the sunfish and catfish families. White catfish are the numerically dominant catfish species, while bluegill and white crappie are the most abundant sunfish inhabiting the quiet waters of Fourteen Mile Slough. Threadfin shad, an introduced fish belonging to the Clupeid family, is also abundant in Fourteen Mile Slough.

The fishery in the lower Calaveras River, which forms the southeast border of the proposed project site, is dominated by members of the sunfish and minnow families. Bluegill and largemouth bass are the two most abundant sunfish, while non-native fish such as carp and golden shiner dominate the minnow family. Native minnows include Sacramento blackfish and Sacramento squawfish. Threadfin shad is the numerically dominant fish in the lower Calaveras River.

The fishery inhabiting the Stockton Deep Water Ship Channel of the San Joaquin River is dominated by members of the sunfish family, primarily bluegill, largemouth bass, and redear sunfish. Sacramento blackfish and white catfish are the dominant native minnow and catfish, respectively.

Table E-4 lists both common and scientific names of resident and anadromous fishes that may inhabit the offsite project Delta waters.

Project Impacts and Mitigation Measures

Potential impacts to offsite fishery resources are primarily water-quality related, and would be of a short- and long-term nature. Short-term water quality impacts would result from dredging and levee breaching activities in the Buckley Cove marina. Long-term impacts would occur primarily as a result of urbanized and golf course runoff. These impacts could be significant, particularly if the affected areas are used by anadromous fish species for spawning, feeding, or nursery grounds.

Short-Term Impacts

Impact: Increased Turbidity and Suspended Sediment Levels

Short-term impacts would be caused by dredging and levee breaching activities in Buckley Cove adjacent to the R-1 residential development (see Figure 3). Dredging activities would temporarily increase turbidity levels and suspended sediments, which may contribute to a reduction in light penetration and interfere with photosynthesis, thereby reducing dissolved oxygen levels and primary productivity in Buckley Cove. Moreover, high turbidity and suspended sediments can have significant impacts on fish due to gill clogging and abrasion of gill filaments.

Dredging and breaching in the Buckley Cove marina also would temporarily reduce benthic (bottom) organisms in the construction area. Bottom-feeding fish such as sturgeon, catfish, carp, and possibly striped bass, which feed on benthic invertebrates, particularly corophium species,

Table E-4. Common and Scientific Names of Delta Resident
and Anadromous Fish Species

| Family | Scientific Name | Common Name | Occurrence in Delta ^a |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| Petromyzontidae - lampreys | <u>Lampetra tridentata</u> | Pacific lamprey | N,A |
| Clupeidae - herrings | <u>Alosa sapidissima</u> <u>Dorosoma petenense</u> | American shad Threadfin shad | I,A I |
| Salmonidae - trouts | <u>Salmo gairdneri</u> <u>Oncorhynchus tshawytscha</u> <u>Oncorhynchus kisutch</u> | Steelhead trout Chinook salmon Coho salmon | N N,A N,A |
| Cyprinidae - minnows | <u>Cyprinus carpio</u> <u>Carassius auratus</u> <u>Notemigonus crysoleucas</u> <u>Orthodon microlepidotus</u> <u>Lavinia exilicauda</u> <u>Ptychocheilus grandis</u> <u>Hesperoleucus symmetricus</u> <u>Mylopharodon conocephalus</u> <u>Pogonichthys macrolepidotus</u> <u>Pimephales promelas</u> | Common carp Goldfish Golden shiner Sacramento blackfish Hitch Sacramento squawfish California roach Hardhead Sacramento splittail Fathead minnow | I I I N N N N N N I |
| Catastomidae - suckers | <u>Catostomus occidentalis</u> | Sacramento sucker | N |
| Ictaluridae - bullhead and catfish | <u>Ictalurus punctatus</u> <u>Ictalurus catus</u> <u>Ictalurus natalis</u> <u>Ictalurus nebulosus</u> <u>Ictalurus melas</u> <u>Ictalurus furcatus</u> | Channel catfish White catfish Yellow bullhead Brown bullhead Black bullhead Blue catfish | I I I I I I |
| Poeciliidae - livebearers | <u>Gambusia affinis</u> | Mosquitofish | I |
| Atherinidae - silversides | <u>Menidia audens</u> | Mississippi silverside | I |
| Gasterosteidae - sticklebacks | <u>Gasterosleus aculeatus</u> | Three-spine stickleback | N |
| Percichthyidae - temperate basses | <u>Morone saxatilis</u> | Striped bass | I,A |
| Centrarchidae - sunfishes | <u>Pomoxis nigromaculatus</u> <u>Pomoxis annularis</u> <u>Lepomis gulosus</u> <u>Lepomis cyanellus</u> <u>Lepomis macrochirus</u> <u>Lepomis microlophus</u> <u>Micropterus salmoides</u> <u>Micropterus dolomieu</u> <u>Micropterus punctulatus</u> <u>Archoplites interruptus</u> <u>Micropterus coosae</u> <u>Lepomis gibbosus</u> | Black crappie White crappie Warmouth Green sunfish Bluegill Redear sunfish Largemouth bass Smallmouth bass Spotted bass Sacramento perch Redeye bass Pumpkinseed | I I I I I I I I I N I I |
| Percidae - perches | <u>Percina macrolepida</u> | Bigscale logperch | I |
| Embiotocidae - surfperches | <u>Hysterocarpus traskii</u> | Tule perch | N |
| Cottidae - sculpins | <u>Cottus gulosus</u> <u>Cottus asper</u> <u>Leptocottus armatus</u> | Riffle sculpin Prickly sculpin Pacific staghorn sculpin | N N N |

^a N = native
I = introduced
A = anadromous

the dominant benthic invertebrate in the Delta (U. S. Army Corps of Engineers 1976), may be temporarily impacted as a result of dredging activities.

The degree to which dredging affects fishery resources through water quality degradation is partially determined by the timing of dredging activities. Several mitigation measures could help reduce dredging impacts to a less-than-significant level. Some of these measures are described in Section D, "Hydrology and Water Quality." Additional measures that could be implemented to minimize fishery impacts during dredging operations are described below.

The loss of benthic populations is a substantial problem that cannot be mitigated; however, the effect is temporary, except where habitat is permanently altered, and is therefore considered less than significant.

Impacts to fish gill tissue from suspended sediments and increased turbidity also cannot be mitigated; however, this impact also is temporary and is therefore considered to be less than significant.

Mitigation Measures

To mitigate short-term impacts to less-than-significant levels, the following mitigation measures are recommended.

- o Prohibit dredging and breaching in Buckley Cove marina from April 1 - June 30, to minimize impacts to spawning and egg stages of important fish species that may utilize the cove for spawning.
- o Restrict levee construction activities to the landward side to minimize impacts to the wetland areas and shorezone aquatic habitat.
- o Dredged material should not be placed in shallow open water areas that provide spawning and nursery habitat for important fish or invertebrate species.

Long-Term Impacts

Impact: Increased Flow of Urban and Construction-Related Runoff to Rivers and Sloughs with Aquatic Habitat

Potential long-term impacts to offsite fishery resources would occur primarily as a result of runoff from urbanized uses that would enter the San Joaquin River at Buckley Cove via Ten Mile Slough (see Section D, "Hydrology and Water Quality," for a detailed runoff description). Runoff from surface streets, paved streets, landscaped areas, and the golf course typically contains heavy metals, pesticides, herbicides, fertilizers, and sediments. The concentrations of pollutants carried in urban runoff are extremely variable, depending on such factors as runoff volume, the relative mix of land uses in the proposed development, and other factors.

Golf course runoff, carrying high concentrations of nutrients (biostimulants) such as phosphates and nitrates, will be pumped directly into Ten Mile Slough. The high nutrient concentration of the runoff would stimulate high phytoplankton population growth in Ten Mile Slough. A dissolved oxygen depression may occur when this water is pumped into Buckley Cove, a result of the transition from a shallow, highly productive environment (Ten Mile Slough), to a deeper, slower moving body of water with poor circulation (Buckley Cove), where most of the water volume is below the euphotic zone (shallow portion of the water column where respiration exceeds photosynthesis). This dissolved oxygen sag may impact aquatic life in Buckley Cove, particularly spawning and juvenile fish that may use the shorezone habitat in Buckley Cove. This impact is considered potentially significant.

Mitigation Measures

The following mitigation measures are recommended to reduce long-term impacts to a less-than-significant level.

- o Compensation for Dissolved Oxygen Depletions. If dissolved oxygen levels fall below the minimum acceptable limit of 5 mg/l (U. S. Environmental Protection Agency 1976), oxygen can be injected into Buckley Cove to compensate for the reduced levels.
- o Construction Practices. The proposed construction in the Buckley Cove Marina should be done so as to minimize sedimentation and water quality impacts to the San Joaquin River fishery. It is expected that permits required by the DFG and COE will partially mitigate water quality impacts to fish.
- o Water Quality Monitoring to Protect Fish Health. A water quality monitoring program should be implemented during dredging and filling activities, and standards suitable to fish survival should be maintained throughout the construction period. A partial list of physical and chemical parameters to be included in the monitoring program are: dissolved oxygen, water temperature, turbidity, suspended sediments, and heavy metals.

Cumulative Impacts and Mitigation Measures

During the last century waters in San Joaquin County, particularly those within the Delta, have changed dramatically. Land reclamation, dredging, water development projects, water pollution, and habitat destruction have resulted in the loss of numerous fish species, causing a general decline in the Delta fishery. This impact is considered significant.

Potential mitigation measures for cumulative impacts due to water and land development projects generally include:

- o Safeguards by state and federal laws including:
 - CEQA
 - NEPA
 - National Fish and Wildlife Coordination Act
 - National Clean Water Act.
- o Maintenance of adequate water flows to ensure the perpetuation of fish migration and spawning.
- o Maintenance and restoration of shoreline and aquatic vegetation to provide fish food and cover.
- o Implementation of water management plans that will help reduce water demand by reclaiming wastewater and making conjunctive use of groundwater and surface water sources. A plan to reduce pollutant discharges into Delta water bodies could also be implemented.

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